Manipulating the phase transition of 2D heterostructures

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The stacking of two-dimensional (2D) materials into van der Waals heterostructures has led to the discovery of numerous intriguing physical phenomena, such as the Hofstadter effect, commensurate-incommensurate transitions, correlated insulating states, and superconductivity. Depending on the stacking order and relative orientation of the constituent layers, a variety of structural phases and electronic states can emerge. However, manipulating transitions between these structural phases remains a significant challenge. In this study, we use a hBN/graphene/hBN heterostructure as a model system to uncover the origins of interlayer interactions in van der Waals heterostructures. We investigate how external perturbations—specifically electric fields, magnetic fields, and electrostatic gating—can induce sliding and twisting between layers, providing new insights into the tunability of these complex systems.

References

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Figures

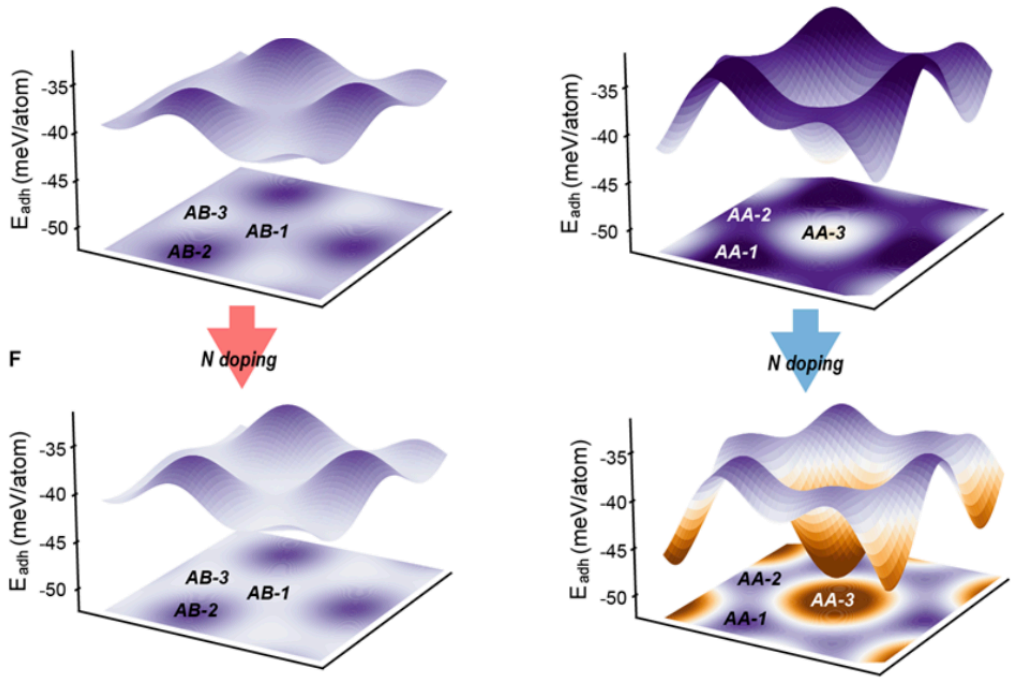

Figure 1: Tuning the Moire potential of the hBN/Graphene/hBN heterostructure via charge modulation of graphene.